Kruse Electronics

Model 570-15001

February 7, 1973

SYSTRON DONNER

Kruse Electronics

PRELIMINARY INSTRUCTION MANUAL

Kruse Electronics

Model 570-15001

February 7, 1973

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KRUSE ELECTRONICS
DIVISION
SYSTRON DONNER
CORPORATION

735 Palomar Avenue, Sunnyvale, California 94086 USA
Telephone (408) 735-9660, TWX 910-339-9309

SYSTRON DONNER

WARRANTY AND REPAIR

Issued 1 January 1974

SHIPMENT DAMAGE

The instrument described in this manual should be tested as soon as it is received. If it fails to operate properly or is damaged in any way, a claim must be filed with the carrier. Have carrier agent inspect damage to instrument and packing crate and forward us a copy of his written report. You will then be advised of replacement or repair arrangements and disposition of the equipment. Please *include model number and serial number* when referring to this instrument for any reason.

WARRANTY

Systron-Donner (Sunnyvale) products are warranted against defects in workmanship and materials. This warranty is limited to repair or replacement of products or parts which prove defective in normal service after delivery to original purchaser. The warranty period is two years for all instruments and parts manufactured at the Sunnyvale, California plant of Systron-Donner Corporation. The warranty period on cathode ray tubes and YIG-tuned oscillators, built by other manufacturers, is limited to one year. Although Systron-Donner endeavors to purchase the finest quality parts available, the warranty from the manufacturer on these major components is one year.

Beyond the "shipment damage" provisions, no warranty attaches to the detection element used in Model 4020 Digital Power Meter power heads. Failures of this element are usually caused by excessive input power or by physical shock (dropping the power head), neither of which can be covered by warranty.

If any fault develops:

1. Notify the local service center or the factory, giving *full details* of the difficulty, *including the model number and serial number*. Upon receipt of this information, you will be sent service or shipping instructions.
2. Upon receipt of shipping instructions, forward the instrument prepaid and insured, and repairs will be made at the service center or factory. If requested, an estimate will be made before the work begins when the instrument is not covered by this warranty.

Systron-Donner Corporation is not responsible for consequential damage or loss of data in the event of equipment failure.

PACKING

The instrument described in this manual should be packed in the original carton. If original carton is unusable or not available, use a heavy cardboard box with approximately three inches of foam or other shock-absorbing material surrounding the instrument. If desired, packing services of a local transfer and storage company may be employed. Specific packing instructions are given in Section 2 of most instruction manuals.

SHIPPING METHOD

The instrument described in this manual should only be shipped by truck freight, rail freight, air freight, or parcel delivery service. *If it is shipped by parcel post, damage is likely to occur.* Systron-Donner is not responsible for units damaged in shipment to the service center or factory for repair, whether such units are in warranty or not.

INSURANCE

For your own protection, insure the unit for full value whenever it is shipped.

SYSTRON-DONNER CORPORATION – SUNNYVALE INSTRUMENTS GROUP
735 PALOMAR AVENUE, SUNNYVALE, CALIFORNIA 94086 • Phone (408) 735-9660 • TWX 910-339-9309

INSPECTION CHARGES

Nominal inspection charges will be levied if a unit returned for warranty repairs shows no evidence of malfunction or if it operates within its published specifications.

FREIGHT CHARGES

Instruments returned for warranty repair must be sent with *all freight charges prepaid* to the factory in Sunnyvale, California or to the local Systron-Donner service center in your area. After repair, instruments will be returned from the factory or local service center with "collect" freight charges, or freight costs will be billed later.

If air freight or other premium shipment method is desired, please notify the factory or the local service center in advance so arrangements can be made.

SYSTRON DONNER SERVICE CENTERS

Eleven customer service centers are in operation throughout the United States, Europe, and The Pacific. It may be to your advantage to use these local centers for warranty repair, non-warranty repair, or calibration services. If no service center is listed for your area, call the local SCIENTIFIC DEVICES Office for information.

NEW ENGLAND

Systron Donner Service Center
580 Moody Street
Waltham, Massachusetts 02154
Telephone (617) 894-0559

EAST COAST

Systron Donner Service Center
71 Grand Avenue
Palisades Park, New Jersey 07650
Telephone (201) 945-4500

WASHINGTON, D.C. AREA

Systron Donner Service Center
6615 Backlick Road
Springfield, Virginia 22150
Telephone (703) 451-6500

MIDWEST

Systron Donner Service Center
2720 Des Plaines Avenue
Des Plaines, Illinois 60018
Telephone (312) 297-5240

SOUTHWEST

Systron Donner Service Center
312 North Central Expressway
Richardson, Texas 75080
Telephone (214) 231-8106

NORTHERN CALIFORNIA

Systron Donner Service Center
655 West Evelyn Avenue
Mountain View, California 94041
Telephone (415) 964-4230

SOUTHERN CALIFORNIA

Systron Donner Service Center
3662 Katella Avenue, Suite 105
Los Alamitos, California 90720
Telephone (213) 596-1684

UNITED KINGDOM

Systron-Donner, Ltd.
St. Mary's Road
Sydenham Industrial Estate
Leamington Spa, Warwickshire, England
Telephone Leamington Spa (0926) 35411

FRANCE

Systron-Donner S. A.
24 rue de Paris
78560 Le Port Marly
Telephone 958. 48-63 (lignes groupées)

GERMANY

Systron-Donner GmbH
Bodensee Strasse 113
D-8000 Munich 60
Telephone (089) 8 71 10 21

AUSTRALIA

Systron-Donner Pty. Ltd.
2 Vautier Street
Elwood, Victoria 3184
Telephone 91 2223

SECTION 1

INTRODUCTION AND DESCRIPTION

1.1 SCOPE OF MANUAL

These preliminary instructions are supplied to provide operating information, specifications, parts lists, and schematic diagrams for the 570-15001 RF plug-in. Permanent instruction manuals, when available, will include application information, operating instructions, theory of operation, and maintenance instructions.

1.2 DESCRIPTION

Model 570 series RF plug-ins are used in the Kruse Model 540 Multiband Sweeper; the 570-15001 is a high power (35 mW) unit operating in the 8.7 to 10.3 GHz band. The unit may be leveled externally or operated unleveled.

The RF plug-in is an all solid-state (no BWO's) fundamental-frequency generator (no frequency multipliers or BFO's).

Major subassemblies of the RF plug-in include the single AM board, which contains all amplitude modulation circuits including the leveling circuits, a plug-in linearizer board which shapes the frequency-controlling voltages, an oscillator module which generates the RF signal, and a modulator module which contains the amplitude-controlling PIN diode.

1.3 SPECIFICATIONS

Operating specifications for the 570-15001 are listed on the following page.

KRUSE ELECTRONICS DIVISION
SYSTRON DONNER

MODEL 570-15001
OSCILLATOR PLUG-IN
8.7-10.3 GHz

SPECIFICATIONS

When operated in Model 540 Sweeper

Frequency Range:	Rated 8.8-10.2 GHz Usable 8.7-10.3 GHz
Power Output: (into 50 ohms)	35 mW min. from 8.8-9.9 GHz, at +25° C ambient, 10 mW min. over rated band.
Power Variation:	Unleveled, ±0.4 dB from 8.8-9.9 GHz Leveled, ±0.05 dB plus external power sampler error.
Frequency Accuracy:	±0.5% of indicated value at +25°C
Spurious Signals:	Harmonic, 20 dB below max. output Non-Harmonic (>1 MHz from F_o), 60 dB below max. output.
Residual AM Index @ Max. Output:	- 46 dB Unleveled - 40 dB Leveled
Residual FM, 1 Hz to 30 KHz:	CW mode, 20 KHz peak Sweep mode, 40 KHz peak
Frequency Stability, % of F_o:	
Temperature Change	±0.05%/°C
Load VSWR 1:1 to 3:1, any phase	±0.5%
6 dB RF Power Change	±0.25%
10% Line Voltage Change	±0.001%
ΔF Sweep Range:	±80 MHz
Temperature Range:	Operating 0° to +55°C Ambient Non-Operating -55 to +85°C

6/5/72

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Unleveled Indicator:	Front panel lamp lights when output power is unleveled.
Power Output Control:	Front panel control provides >30 dB of unleveled power control and > 6 dB of leveled power control.
Leveled-Unleveled Control:	Front panel switch selects either externally leveled or unleveled operation.
External Detector Input:	Rear panel BNC connector. Input sensitivity approximately -10 mV/mW of leveled output power.
Phase-Lock Input:	Rear panel BNC connector. Sensitivity is approximately 15 MHz/Volt. Controlled 6 dB/octave roll-off from 2 to 500 KHz.
RF Output:	Rear panel precision stainless Type "N" female connector.

SECTION 2

INITIAL INSTRUCTIONS

2.1 UNPACKING AND INSPECTION

The instrument is shipped in a specially constructed container to provide maximum protection to the equipment during transit. Use care when unpacking to prevent damage to the equipment, such as cabinet finish, controls, indicators, connectors, etc.

Removing Contents. To remove the instrument from the shipping container, cut and fold back outer carton top flaps, remove top protective cushion, lift instrument clear from shipping container, open dust protection bag and remove equipment.

Inspection. The instrument was carefully tested and inspected prior to shipment. Inspect the instrument for damage incurred during shipment. If the instrument is damaged in any way, see the warranty and repair notices at the front of this manual.

2.2 PREPARATION FOR USE

Each RF plug-in is supplied with a metal dial drum for frequency readout in the 540 sweeper:

a. Insert the RF plug-in into the rectangular hole at the right-hand-side of the 540.

b. Lock the plug-in in place by turning the small knob at the bottom CW.

c. If necessary, install a new dial drum in the 540 following steps, d through h.

d. Remove the top cover of the instrument; it is held in place with two screws.

e. Face the instrument holding the dial scale drum with its gear to the left, and smooth rounded end knob to the right.

f. Push the smooth knob into its mating receptacle near the plug-in compartment shield. The spring will give way allowing you to lower the left side of the drum.

g. Snap the drum into place and align the locating key with the mating groove in the left side of the drum assembly.

h. Rotate the BAND SELECT knob to assure smooth operating of drum assembly.

2.3 REPACKAGING FOR SHIPMENT

If the instrument is to be packaged for re-shipment, use the original shipping container and packaging. If the original packaging has been discarded or is not in condition for re-use, perform the following packaging procedure:

a. Wrap the instrument in a heavy paper wrapping or plastic protective covering.

b. Place a protective cushion in the bottom of shipping carton and place the instrument on the cushion.

c. Surround the remaining sides and top with additional protective cushions to provide support of the instrument without resting on the controls or connectors.

SECTION 3

OPERATION

3.1 CONTROLS, INDICATORS, AND CONNECTORS

The controls, indicators, and connectors on the front and rear panels of the 570-15001 are shown in Figure 3.1 and described in Table 3.1.

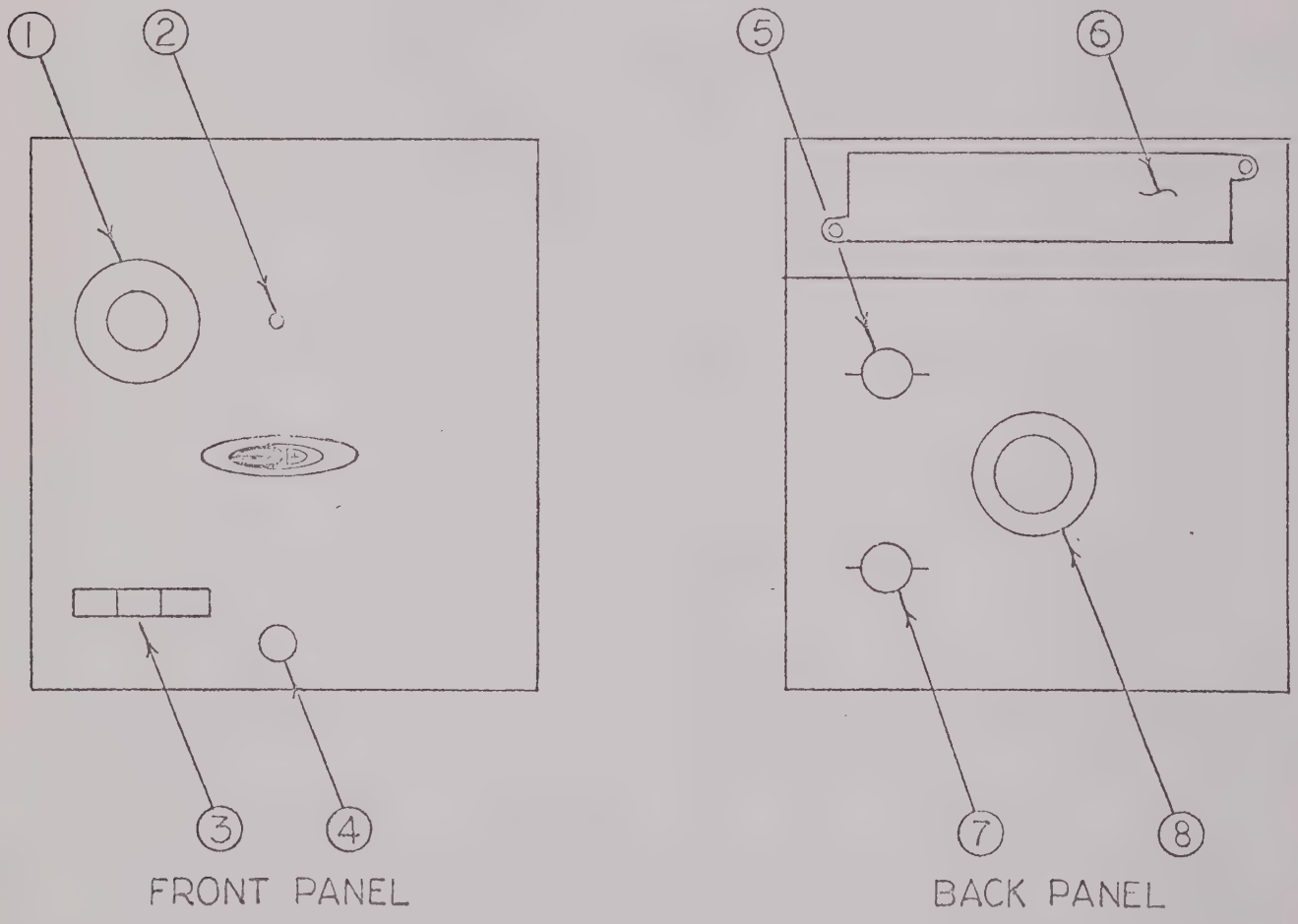


Figure 3.1 Model 570-15001 Controls, Indicators, and Connectors

Table 3.1 Model 570-15001 Controls, Indicators, and Connectors

Figure 3.1 Index	ITEM	FUNCTION
1	RF LEVEL Control	Black knob/potentiometer. Controls the RF output amplitude of the plug-in; when the plug-in is internally or externally leveled, the dial graduations read directly in milliwatts. This control has a range of ≈40 dB.
2	UNLEVELED Indicator	Red light-emitting diode. Illuminates to indicate that LEVELING OFF pushbutton has been depressed, or that the setting of the POWER control is too high when the LEVELING INT or LEVELING EXT pushbutton is depressed; the indicator will illuminate when the external leveler is disconnected or functioning abnormally in LEVELING EXT.
3	LEVELING Switches	Black pushbutton switches; interlocked. Select mode of amplifier leveling employed:
	INT Position	Units with Option M2 include internal power leveling; when the LEVELER switch is set to INT, the RF output is leveled at the RF OUT connector of these plug-ins without the use of an external detector. Plug-ins without internal leveling do not operate properly when the switch is set to INT: there is no control of power level with the RF LEVEL control; the output is either fully on or fully off.
	OFF Position	The RF output is unleveled, but the RF LEVEL control may be used for control. Maximum peak power output is available in this position.
	EXT Position	All plug-ins may be externally leveled using an appropriate leveler. In this position, an external negative voltage at the LEVELER EXT DET connector is used to control the RF output over the frequency range of the plug-in.

4	Locking Screw	Knurled knob. Used to lock RF plug-in in place in mainframe.

NOTE: This knob must be tightened to ensure low noise and proper seating of the interface connector.

5	EXT DET Connector	BNC connector. The external detector signal is fed in through this connector.
6	Interface Connector	Rear Panel 32 pin connector. Mates to connector in 540 plug-in compartment, allowing operating and signal voltages to be passed between the units.
7	PHASE LOCK Connector	BNC connector. A phase lock signal for frequency control or FM'ing may be fed in at this point.
8	RF OUT Connector	Precision Type N Connector. The RF output of plug-in is fed to this point; output impedance is 50 Ω.

3.2 OPERATING NOTES

Internal Modulator. The 540 internal 1 kHz modulator drives the 570-15001 modulator with a square wave, reducing the RF output of the plug-in on positive 1 kHz peaks. Most VSWR amplifiers and ratiometers will respond to the demodulated 1 kHz signal. If one of these units is being used, the 1 KHZ ADJ control on the rear panel of the 540 should be tuned for maximum response of the meter in use before measurements are made. Tuning the plug-in modulating frequency to that of the VSWR amplifier will considerably increase the measurement accuracy and signal-to-noise ratio.

Leveling. Leveling is the process which overcomes the natural tendency of RF sources to generate different power levels at different frequencies due to resonances, losses, and other frequency-sensitive factors. The desired end result for the 570-15001 RF plug-in is for the power level generated at all frequencies to be identical. When a plug-in is leveled internally, the power level at the RF OUT connector is essentially flat over the specified frequency range.

To be most useful, leveling should be accomplished as closely as possible to the point of measurement; external leveling is most desirable above 500 MHz or so due to the effects of standing waves in the coaxial cables and frequency sensitivities in other coaxial components in a given test setup. When external leveling is used, the power level at the output of the leveler is essentially identical for all output frequencies.

Phase Lock Input. The phase lock input for the 570-15001 RF plug-in is physically located on the rear panel of the plug-in, but electrically connects directly to the oscillator in the plug-in. Generally, the phase lock input is used to directly control the oscillator frequency to maintain a fixed output frequency or to generate FM. In the first case, the output of a discriminator is commonly used; in the second case, the AC-coupled output of a low-frequency oscillator is used.

SECTION 4

MAINTENANCE

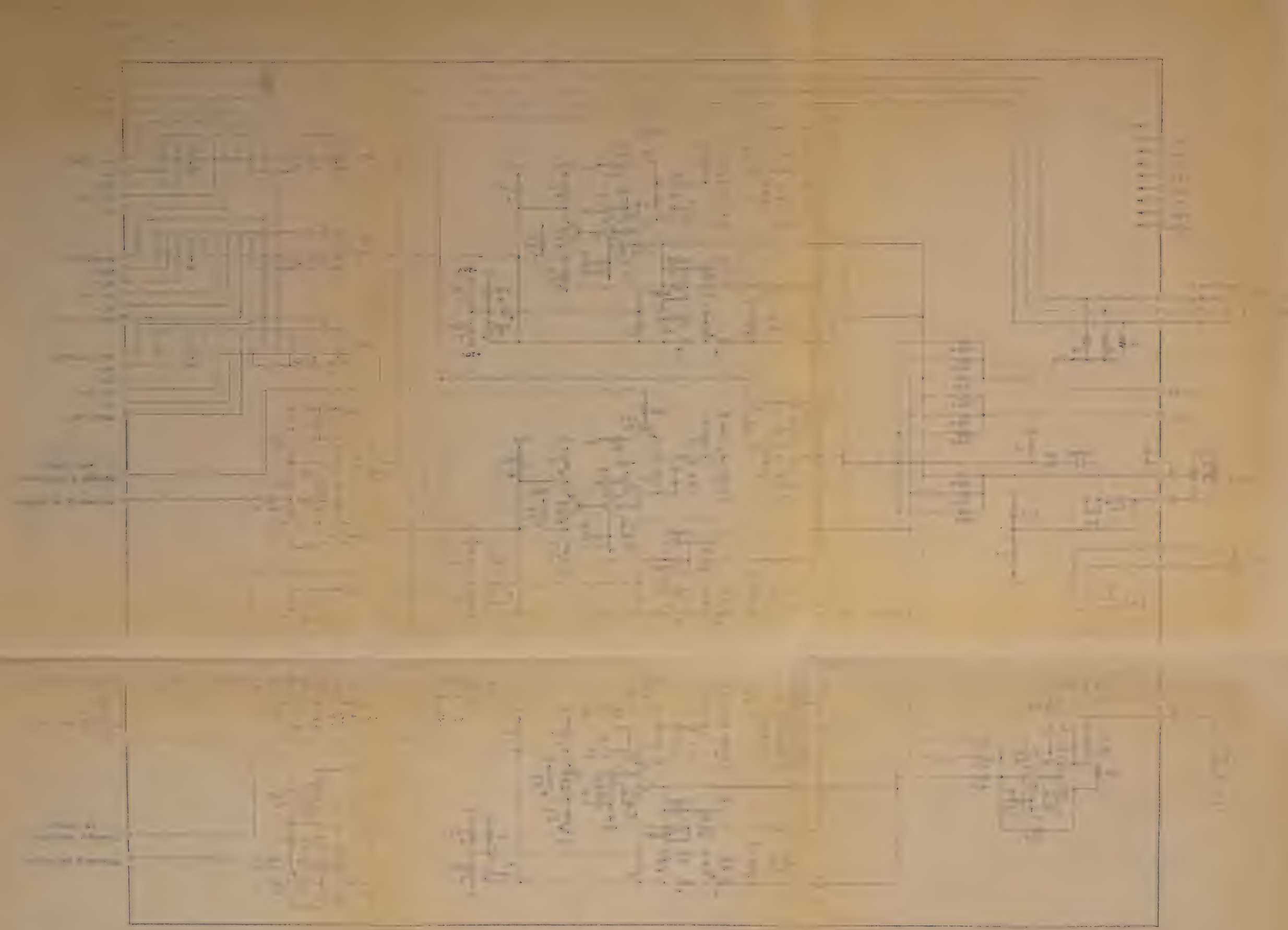
4.1 ROUTINE MAINTENANCE

The 570-15001 does not require routine maintenance or calibration; it should of course be kept free of dust and dirt, but no regularly-scheduled maintenance is necessary. Clean the filter and vacuum out the cooling air channel as required.

4.2 CORRECTIVE MAINTENANCE

Field repair of the 570-15001 is not recommended. The oscillator, heart of the plug-in, is not a field-repairable item. Replacement oscillators can be supplied for replacement in the field, but the following facts should be kept in mind:

- Many oscillators can be repaired at the factory, at far lower cost than that of a new oscillator.
- Even after an oscillator has been replaced, the plug-in unit will still have to be linearized and calibrated by the selection of precision fixed components. This is a job best done at the factory.
- The plug-in unit and oscillators are covered by a one- or two-year warranty; refer to the front of this manual. Attempted repair may void this warranty.



DATE	SYM	REVISION RECORD	AUTH.	DR	CK
6-73	-	ENGR REL MKD 1966	[illegible]	TP	[illegible]

LINEARIZER
5462+4

J1

+250V

+20V

-20V

PHASE LOCK INPUT (OPTIONAL)

TUNING INPUT

CR18 IN5232 5.6V

C1 .01 100V CER DISC

C3 .01 100V CER DISC

R34 100K *

R37 47K *

C5 27 Pf

C6 27Pf

R33 47K *

R38 10K

IC1 LM301A

IC2

R35 24K

R36 24K

C4 .01 100V CER DISC

C2 .01 100V CER DISC

CR19 IN5232 5.6V

R40 *

R41 *

R42 *

R43 2K *

R47 *

R48 1M 10% *

R52 18K 2W 10%

R53 18K 2W 10%

R54 *

R55 51K

C7 330Pf

R51 10K

R56 820

Q1 2N 4314

R57 510 1/2W

CR25 IN5266 6.8V

C8 .01 100V CER DISC

C12 10Pf

C11 150Pf

R50 5.1K

Q2 2N 3440

IC3 LM301A

C20

CR21 IN 4446 (2)

C9 .01 100V CER DISC

C10 .22,80V MYLAR

R58 100K

C13 100Pf

R59 68K

CR22 IN 4446

R61 10K

Q3 2N 4314

Q4 2N3440

R66 10K

CR23 IN 4446

R62 2K

R63 2.7K

R64 22K

R65 10K

CR24 IN 4446

R46 *

R60 1M 10%

R44 *

R45 *

R1 * R2 * R3 * R4 * R5 * R6 * R7 * R8 * R9 * R10 * R11 * R12 *

R13 * R14 * R15 * R16 * R17 * R18 * R19 * R20 * R21 * R22 * R23 *

R24 * R25 * R26 * R27 * R28 * R29 * R30 * R31 * R32 *

IN4446

CR17

PHASE LOCK

VOLTAGE TUNED OSCILLATOR

+20V

-20V

RF OUT

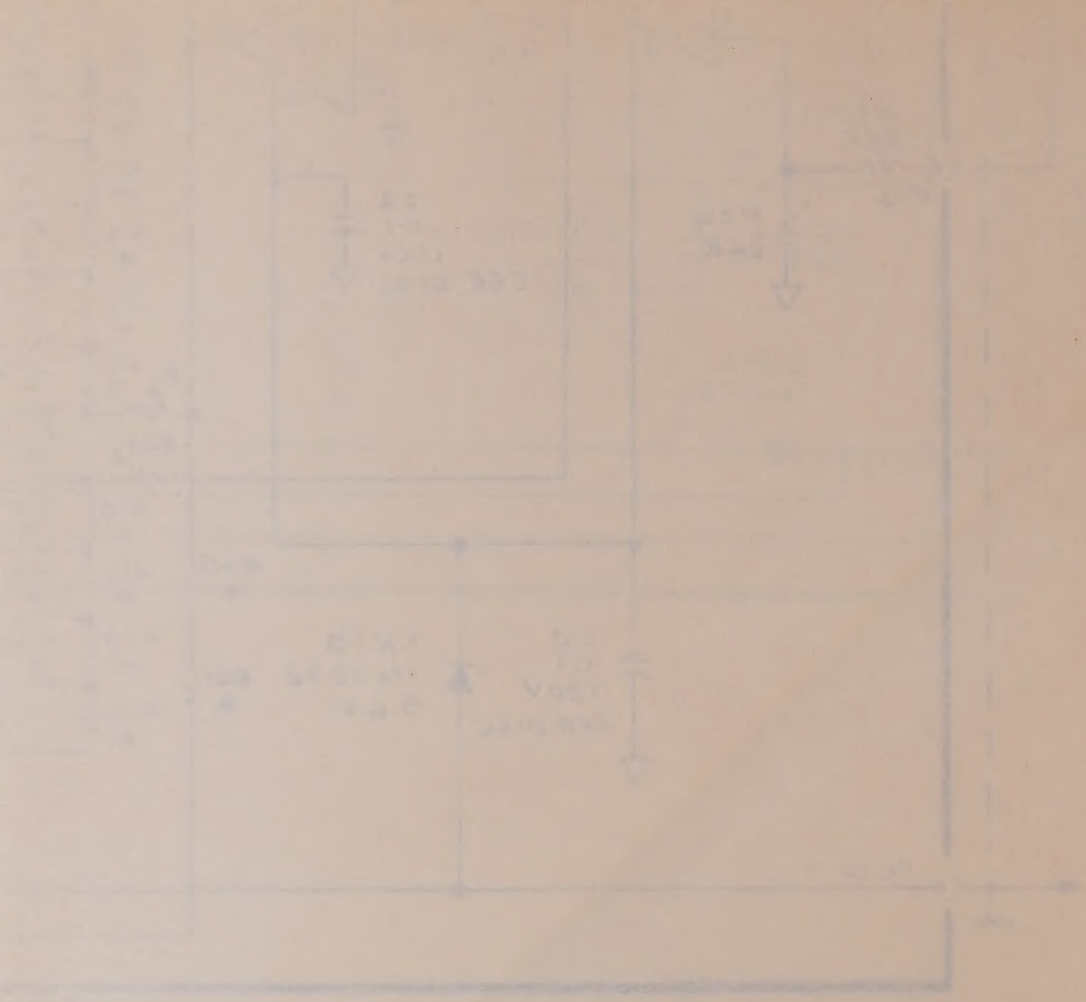
+3V TO +6V ON
0V OFF
QUIETING INPUT

NOTES:

1.) UNLESS OTHERWISE SPECIFIED:
- 1A. ALL RESISTORS IN OHMS, 1/4 W, 2%, METAL FILM
- 1B. ALL RESISTORS LABELED 5% OR 10% ARE 1/4 W FIXED COMP
- 1C. ALL RESISTORS LABELED 1% OR, 1% WW ARE WIRE WOUND
- 1D. ALL CAPACITORS IN MICROFARADS, 500V. MICA

2) * INDICATES VALUES SELECTED AT TEST

TOLERANCES (EXCEPT AS NOTED)	SYSTRON DONNER		
DECIMAL ± —	570 SERIES	SCALE	DRAWN BY HL-N
FRACTIONAL ± —	TITLE SCHEMATIC DIAGRAM LINEARIZER		APPROVED BY
ANGULAR ± —	DATE 2-21-73	DRAWING NUMBER C 900424	REV. —



MP MASTER
MA34064